

WHAT IS CLAIMED IS:

1. Multi-layered prophylactic article, in particular a medical glove, made from an elastomeric base layer, such as a synthetic or natural latex for example, with an internal and an external surface, at least a part region of the internal surface being provided with an anti-friction layer made from a polymeric material with an internal surface and an external surface facing the internal surface of the base layer, wherein at least a part region on the internal surface of the base layer and/or between the base layer and the anti-friction layer and/or in the anti-friction layer and/or on the internal surface of the anti-friction layer is provided with at least one active substance and/or dye inside particles, in particular microcapsules, with a maximum diameter selected from a range with an upper limit of 500  $\mu\text{m}$ , in particular 400  $\mu\text{m}$ , preferably 300  $\mu\text{m}$  and a lower limit of 10  $\mu\text{m}$ , preferably 30  $\mu\text{m}$ , in particular 40  $\mu\text{m}$ , and/or a layer incorporating the at least one active substance and/or dye is disposed in at least a part region between the base layer and the anti-friction layer, which anti-friction layer has regularly recurring raised areas or recesses of an irregular shape, produced by rapidly removing liquid from the anti-friction layer, in which a proportion of the recesses selected from a range with a lower limit of 20 %, in particular 35 %, preferably 40 %, and an upper limit of 95 %, in particular 80 % preferably 75 %, by reference to the total number of recesses, extends through the entire thickness of the anti-friction layer.

2. Prophylactic article as claimed in claim 1, wherein the diameter of the particles is selected from a range with an upper limit of 250  $\mu\text{m}$ , preferably 200  $\mu\text{m}$ , in particular 150  $\mu\text{m}$ , and a lower limit of 50  $\mu\text{m}$ , preferably 80  $\mu\text{m}$ , in particular 100  $\mu\text{m}$ .

3. Prophylactic article as claimed in claim 1 or 2, wherein the diameter of the particles is at least 80 %, preferably at least 85%, in particular at least 90%, of the thickness of the anti-friction layer.

4. Prophylactic article as claimed in claim 3, wherein the diameter of the particles is the same size as the thickness of the anti-friction layer.

5. Prophylactic article as claimed in claim 3, wherein the diameter of the particles is bigger than the thickness of the anti-friction layer.

6. Prophylactic article as claimed in one of claims 1 to 5, wherein the part region encompasses the region of the distal forearm and/or the carpal bones and/or the metacarpals and/or the base, middle and terminal phalanges of the fingers.

7. Prophylactic article as claimed in one of claims 1 to 6, wherein the particles and/or the layer is applied to both the palm side and dorsal side in at least one part region.

8. Prophylactic article as claimed in one of claims 1 to 7, wherein the part region extends across a region of the internal surface of the base layer and/or between the base layer and the anti-friction layer and/or in the anti-friction layer and/or on the internal surface of the anti-friction layer in a range with a lower limit of 40 %, preferably 50 %, in particular 60 %, and an upper limit of 100 %, preferably 80 %, in particular 70%.

9. Prophylactic article as claimed in one of claims 1 to 8, wherein the particles and/or the layer is a different colour from the base layer and anti-friction layer.

10. Prophylactic article as claimed in one of claims 1 to 9, wherein the particles are water-insoluble.

11. Prophylactic article as claimed in one of claims 1 to 9, wherein the particles are water-soluble.

12. Prophylactic article as claimed in one of claims 1 to 11, wherein the active substance has an antibacterial or antiviral or germicidal or spermicidal or protective action.

13. Prophylactic article as claimed in claim 12, wherein the active substance is selected from a group consisting of chlorohexidin, e.g. a gluconate, an acetate, a hydrochloride, nonoxinol 9 and aloe vera.

14. Prophylactic article as claimed in one of claims 1 to 13, wherein the active substance is selected from a group consisting of vitamins, plant extracts, in particular secondary plant extracts.

15. Prophylactic article as claimed in claim 14, wherein vitamins are selected from a group consisting of compounds with a retinoid structure (vitamin A), vitamin B-complex, ascorbic acid (vitamin C), calciferols (vitamin D), tocopherols (vitamin E), vitamin K, flavonoids and biotin.

16. Prophylactic article as claimed in one of claims 12 to 15, wherein the concentration of the at least one active substance and/or dye in the particles is selected from a range with a lower limit of 1 %, preferably 2 %, in particular 5 %, and an upper limit of 20 %, preferably 15 %, in particular 10 %.

17. Prophylactic article as claimed in one of claims 1 to 16, wherein a shell of the particles is pressure-sensitive.

18. Prophylactic article as claimed in one of claims 1 to 17, wherein the particles form the anti-friction layer in at least a part-region.

19. Prophylactic article as claimed in one of claims 1 to 18, wherein a thickness of the anti-friction layer is selected from a range with a lower limit of 30  $\mu\text{m}$ , preferably 40  $\mu\text{m}$ , in particular 50  $\mu\text{m}$ , and an upper limit of 500  $\mu\text{m}$ , preferably 400  $\mu\text{m}$ , in particular 300  $\mu\text{m}$ .

20. Prophylactic article as claimed in claim 19, wherein the thickness of the anti-friction layer is selected from a range with a lower limit of 55  $\mu\text{m}$ , preferably 60  $\mu\text{m}$ , in particular 75  $\mu\text{m}$ , and an upper limit of 200  $\mu\text{m}$ , preferably 150  $\mu\text{m}$ , in particular 110  $\mu\text{m}$ .

21. Prophylactic article as claimed in one of claims 1 to 20, wherein the recesses have a maximum diameter, as seen in plan view, selected from a range with an upper limit of 30  $\mu\text{m}$ , preferably 25  $\mu\text{m}$ , in particular 20  $\mu\text{m}$ , and a lower limit of 1  $\mu\text{m}$ , preferably 5  $\mu\text{m}$ , in particular 10  $\mu\text{m}$ .

22. Prophylactic article as claimed in one of claims 1 to 21, wherein the recesses are crater-shaped and taper in the direction towards the base layer.

23. Prophylactic article as claimed in claim 22, wherein walls of the crater-shaped recesses subtend an angle with the line perpendicular to the anti-friction layer selected from a range with a lower limit of 30 °, in particular 42 °, preferably 47 °, and an upper limit of 80 °, in particular 75 °, preferably 60 °.

24. Prophylactic article as claimed in one of claims 1 to 23, wherein a quantity of the active substance and/or dye is selected so that the active substance and/or dye is preferably released in at least substantially uniform doses throughout the entire time the prophylactic article is being worn.

25. Prophylactic article as claimed in one of claims 1 to 24, wherein the active substance and/or dye has a solubility in water at 20 °C which is selected from a range with a lower limit of 1 g/l, preferably 3 g/l, in particular 4,5 g/l, and an upper limit of 20 g/l, preferably 15 g/l, in particular 8 g/l.

26. Prophylactic article as claimed in one of claims 1 to 25, wherein a solution of the active substance and/or dye in the particles has a pH value selected from a range of 5.5 to 7.5.

27. Prophylactic article as claimed in one of claims 1 to 26, wherein the raised areas are arranged in an at least predominantly network-type arrangement with inter-

connecting webs.

28. Prophylactic article as claimed in claim 27, wherein a height of at least a part of the webs has a value in the range of between 25 % and 100 %, preferably 33 % and 75 %, in particular 40 % and 60 %, of the total thickness of the anti-friction layer.

29. Method of producing a multi-layered prophylactic article, in particular a medical glove, in which at least a base layer is made from an elastomeric material, preferably synthetic or natural rubber, which has an internal surface and an external surface, the internal surface of the base layer having an anti-friction layer of a polymeric material with an internal surface and an external surface facing the internal surface of the base layer, wherein at least one active substance and/or dye inside particles is applied to the internal surface of the base layer and/or between the base layer and the anti-friction layer and/or in the anti-friction layer and/or on the external surface of the anti-friction layer, the particles used having a maximum diameter selected from a range with an upper limit of 500  $\mu\text{m}$ , in particular 400  $\mu\text{m}$ , preferably 300  $\mu\text{m}$  and a lower limit of 10  $\mu\text{m}$ , preferably 30  $\mu\text{m}$ , in particular 40  $\mu\text{m}$ , and /or a layer incorporating at least one active substance and/or dye is applied in the at least one part-region between the base layer and the anti-friction layer, in particular by dipping or spraying, which anti-friction layer has regularly recurring raised areas or recesses of an irregular shape produced by rapidly removing liquid from the anti-friction layer, and a proportion of the recesses selected from a range with a lower limit of 20 %, in particular 35 %, preferably 40 %, and an upper limit of 95 %, in particular 80 %, preferably 75 %, by reference to the total number of recesses, extends through the entire thickness of the anti-friction layer.

30. Method as claimed in claim 29, wherein that the applied particles have a diameter selected from a range with an upper limit of 250  $\mu\text{m}$ , preferably 200  $\mu\text{m}$ , in particular 150  $\mu\text{m}$ , and a lower limit of 50  $\mu\text{m}$ , preferably 80  $\mu\text{m}$ , in particular 100  $\mu\text{m}$ .

31. Method as claimed in claim 29 or 30, wherein the particles and/or layer is or are applied in the form of a heterogeneous mixture, in particular a suspension or dispersion.

32. Method as claimed in claim 31, wherein at least a part-region of the anti-friction layer is formed by the heterogeneous mixture.

33. Method as claimed in one of claims 29 to 32, wherein a concentration of particles in the heterogeneous mixture used is selected from a range with a lower limit of 1 %, in particular 2 %, preferably 5 %, and an upper limit of 50 %, preferably 40 %, in particular 30 %.

34. Method as claimed in claim 22, wherein the concentration of the particles in the heterogeneous mixture is selected from a range with a lower limit of 6 %, preferably 7 %, in particular 10 % and an upper limit of 25 %, preferably 20 %, in particular 15 %.

35. Method as claimed in one of claims 29 to 34, wherein the liquid is removed within a period with a lower limit of 10 s, in particular 25 s, preferably 50 s, and an upper limit of 20 min, in particular 15 min, preferably 10 min.

36. Method as claimed in one of claims 29 to 34, wherein the liquid is removed at a temperature selected from a range with a lower limit of 60 °C, in particular 66 °C, preferably 70 °C, and an upper limit of 150 °C, in particular 125 °C, preferably 110 °C.

37. Method as claimed in one of claims 29 to 36, wherein particles with a water-soluble shell are used.

38. Method as claimed in one of claims 29 to 36, wherein particles with a water-insoluble shell are used.

39. Method as claimed in one of claims 29 to 38, wherein the active substance is a substance with an antibacterial or antiviral or germicidal or spermicidal or protective action.

40. Method as claimed in one of claims 29 to 39, wherein the active substance is selected from a group consisting of chlorohexidin, e.g. a gluconate, an acetate, a hydrochloride, nonoxinol 9 and aloe vera.

41. Method as claimed in one of claims 29 to 40, wherein the substance is selected from a group consisting of vitamins, plant extracts, in particular secondary plant extracts.

42. Method as claimed in claim 41, wherein the vitamins are selected from a group consisting of compounds with a retinoid structure (vitamin A), vitamin B-complex,



ascorbic acid (vitamin C), calciferols (vitamin D), tocopherols (vitamin E), vitamin K, flavonoids and biotin.

43. Method as claimed in one of claims 29 to 42, wherein the at least one active substance and/or dye is contained in the particles in a concentration selected from a range with a lower limit of 1%, preferably 2 %, in particular 5 %, and an upper limit of 20 %, preferably 15 %, in particular 10 %.

44. Method as claimed in one of claims 29 to 43, wherein the particles are applied in at least one part-region in the anti-friction layer.

45. Method as claimed in one of claims 29 to 44, wherein the material used for the anti-friction layer is applied until the latter has a thickness selected from a range with a lower limit of 30  $\mu\text{m}$ , preferably 40  $\mu\text{m}$ , in particular 50  $\mu\text{m}$ , and an upper limit of 500  $\mu\text{m}$ , preferably 400  $\mu\text{m}$ , in particular 300  $\mu\text{m}$ .

46. Prophylactic article as claimed in claim 45, wherein the thickness of the anti-friction layer is selected from a range with a lower limit of 55  $\mu\text{m}$ , preferably 60  $\mu\text{m}$ , in particular 75  $\mu\text{m}$ , and an upper limit of 200  $\mu\text{m}$ , preferably 150  $\mu\text{m}$ , in particular 110  $\mu\text{m}$ .

47. Method as claimed in one of claims 29 to 46, wherein the time during which the liquid is removed is selected so that the recesses produced have a maximum diameter, as seen in plan view, selected from a range with an upper limit of 30  $\mu\text{m}$ , preferably 25  $\mu\text{m}$ , in particular 20  $\mu\text{m}$ , and a lower limit of 1  $\mu\text{m}$ , preferably 5  $\mu\text{m}$ , in particular 10  $\mu\text{m}$ .

48. Method as claimed in one of claims 29 to 47, wherein the time during which the liquid is removed is selected so that crater-shaped recesses are formed which taper in the direction towards the base layer.

49. Method as claimed in one of claims 29 to 48, wherein an active substance and/or a dye has a solubility in water at 20 °C selected from a range with a lower limit of 1 g/l, preferably 3 g/l, in particular 4,5 g/l, and an upper limit of 20 g/l, preferably 15 g/l, in particular 8 g/l.

50. Method as claimed in one of claims 29 to 49, wherein a solution of the active substance and/or dye in the particle is adjusted and/or displaced with a buffer so that it has and maintains a pH value selected from a range of 5.5 to 7.5.

51. Method as claimed in one of claims 29 to 50, wherein the raised areas form an at least substantially network-type pattern with inter-connecting webs.

52. Method as claimed in claim 51, wherein the at least a part of the webs are formed with a height having a value in the range of between 25 % and 100 % preferably 33 % and 75 %, in particular 40 % and 60 %, of the total thickness of the anti-friction layer.